REMARKS

In view of the following remarks, Applicant respectfully requests reconsideration and allowance of the present application. This amendment is believed to be fully responsive to all issues raised in the October 23, 2003, Office action.

Applicants would like to thank the Office for the noted allowability of claims 16 and 17.

Claims Rejected Under - 35 USC §112

The Office has rejected claims 18, 27, 33, 37 and 38 under 35 U.S.C. 112, second paragraph, "as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention." In particular, the Office states:

> A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu,* 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of

the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald,* 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall,* 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche,* 86 USPQ 481 (Bd. App. 1949). In the present instance, claims 18, 27, 33, 37 and 38 recites the broad recitation "b-spline family", and the claims also recites "radial basis" which is the narrower statement of the range/limitation. Why is the B-spline broad? Because does not specify the type of B-spline (non-periodic/periodic/uniform/non-uniform).

Claims 18 and 37 each depend from a claim which recites "defining a radial basis function for each of the examples." Claims 18 and 37 each narrow the "radial basis functions" recited in their respective base claims by further reciting "wherein the radial basis functions are selected from a b-spline family of radial basis functions."

Claims 27 and 33 each depend from a claim which recites "associating a radial basis function with each example." Claims 27 and 33 each narrows the "radial basis functions" recited their respective base claims by further reciting "wherein each radial basis function is selected from the b-spline family of radial basis functions."

37 CFR 1.75(c) states:

> One or more claims may be presented in dependent form, referring back to and further limiting another claim or claims in the same application.

Furthermore, as noted in the Manual of Patent Examining Procedure (MPEP) (Eighth Edition), sec. 2173.05(c):

> While a single claim that includes both a broad and a narrower may be indefinite, it is not improper under 35 U.S.C. 112, second paragraph to present a dependent claim that sets forth a narrower range for an element than the range set forth in the claim from which it depends. For example, if claim 1 reads "A circuit . . . wherein the resistance is 75-150 ohms." and claim 2 reads "The circuit of claim 1 wherein the resistance is 75-100 ohms.", then claim 2 should not be rejected as indefinite. (Emphasis added)

Applicants would like to point out that each of claims 18, 27, 33, and 33 have just this form, where the broader statement of a "radial basis function" is presented in the independent claims, and the radial basis function is further narrowed in the dependent claim when it stated "wherein the radial basis function(s) is/are selected from a b-spline family of radial basis functions." That is, contrary to the Office's assertion noted above, the radial basis function(s) in the dependent claims are narrower than the radial basis functions in the parent claims,

because the radial basis functions in the dependent claims are limited to only those radial basis functions that are selected from a b-spline family of radial basis functions.

Since each of dependent claims 18, 27, 33, and 33 properly further limit the claims from which they depend, and since each of these further limitations is presented in proper "wherein" form, it is respectfully requested that the 35 USC §112, second paragraph rejections of claims 18, 27, 33, and 33 be withdrawn.

With respect to claim 38, Applicants would like to point out that claim 38 does not recite a radial basis function(s) is/are selected from a b-spline family of radial basis functions. In fact, the term "b-spline" does not occur in claim 38. As such, it appears that the inclusion of the rejection for claim 38 with 18, 27, 33, and 33, which is directed to the use of the term b-spline, was inadvertent. As such, the Applicants respectfully request claims the rejection of claim 38 is withdrawn, or that the Office clearly sets forth the reason(s) why claim 38 is being rejected.

Claims Rejected Under - 35 USC §102(a)

Each of claims 1-15, 19-26, 28-32, 34-36, and 39-46 in the present application stand rejected under 35 USC §102(a) as being anticipated by Computer Graphic, Keith Waters, "A muscle Model for Animating Three-Dimensional Facial Expressions," July 1987, Volume 21, number 4, pp 17-24 (hereinafter "Waters").

Before discussing the particular claim rejections, the Applicant would like to generally discuss Waters and various systems and methods described and claimed in the present application.

With respect to the present application, what is described therein involves defining examples relative to an abstract space, the abstract space being defined by at least an adjective or an adverb. Each adjective or adverb represents a separate axis in this abstract space.

As described in the present application, adjectives characterize objects. Some examples of adjectives include "gender," which may range in values along its axis from male to female, the adjective "age," which may range in values along its axis from old to young; and "elbow bend," which may range in values along its axis from no bend to full bend.

As described in the present application adverbs characterize motions. Some examples of adverbs include, for walking, the walker's mood, which may range in values along its axis from happy to sad and the amount of slope the walker is walking, which may range in values from flat to steep.

In accordance with various systems and methods described in the present application, examples are provided that pertain to a shape or motion with respect to an abstract space. For example, an abstract space may include an axis for gender that includes values from male to female and an axis for age that includes values that range from old to young, along with any number of other axes.

As noted in the present application, once these examples have been defined in the abstract space, the challenge is to ascertain mathematically how a shape or motion that was not previously defined in the abstract space is going to look. In accordance with various implementations described in the present application, the non-defined shape or motion is determined by blending the previously selected examples to produce a new example. One way this may be done is to interpolate the new example from the defined examples.

With respect to Waters, what is described therein is a method for modeling facial expressions using muscle models. That is, Waters describes creating various facial expressions by changing the underlying muscles in a model of a face. With respect to this muscle modeling, the Waters reference discusses such things as skin elasticity and the effect the contraction of one model will have on another in this muscle modeling.

Figs 15-22 of Waters show various individual facial expressions that can be constructed using Waters muscle modeling. The facial expressions in Waters are apparently each modeled separately from one another. There is no discussion whatsoever in Waters of interpolating or blending existing facial expressions to produce a new facial expression.

Figs. 4-14 of Waters show various conventional 2 and 3 dimensional representations (i.e., non-abstract space) of various muscles. One figure, Fig. 10, illustrates two muscles. With respect to this figure, Waters describes the

contraction of one muscle will have on the other muscle. What is not described is blending or interpolating the two muscles to produce a third muscle.

Turning now to the claims of the present application rejected under 35 USC §102(a), as noted in §706.02 of the Manual of Patent Examination Procedure (MPEP), "To anticipate a claim, the reference must teach every element of the claim." As will now be described, it is Applicant's position that each of rejected claims 1-15, 19-26, 28-32, 34-36, and 39-46 are allowable for at least the reason that Waters fails to teach every element of the claim.

Claim 1 reads as follows:

1. A blending method comprising:

providing a set of examples that pertain to a shape or motion that is to be animated, the examples being provided relative to a multi-dimensional abstract space defined by at least one of an adjective and an adverb;

selecting a point within the multi-dimensional abstract space that does not coincide with a point that is associated with any of the examples, the selected point corresponding to a shape or motion within the abstract space;

computing a single weight value for each of the examples; and

combining the single weight values for each of the examples in a manner that defines an interpolated shape or motion that is a blended combination of each of the examples of the set of examples.

With respect to the "replacing" element recited in claim 1, it is stated in the October 23rd Office action that:

> Walters [sic] in Figs. 16-22 illustrates the step of "providing a set of examples that pertain to a shape or motion that is to be animated, the examples being provided relative to a multi-dimensional abstract space defined by at least one of an adjective and an adverb," and also covers the limitation of abstract space (an adjective and an adverb). In Figs. 16-22 illustrate a character can be set to happy or sad or sleep or anywhere in between.

It appears from the quoted language that the Office is equating the heads of Figs. 16-22 with the examples recited in claim 1. First, it is important to note that the heads in Figs. 16-22 of Waters Figs. 16-22 do not pertain to a shape or motion that is to be animated, as recited in claim 1. Rather, as noted on page 22 of Waters, "The heads shown in Fig 15-22 were modeled using photographic techniques and mirrored about the meridian of a face." This is point is not trivial, since claim 1 recites defining an interpolated shape or motion that is a blended combination of each of the examples of the set of examples. The heads in Waters are never described as being used to produce another head. That is, the heads are not described as starting point material for a process. Rather, they are the end result of a process.

Additionally, the head drawings in Waters are not "provided relative to a multi-dimensional abstract space defined by at least one of an adjective and an

adverb," as recited in claim 1. Rather, they are provided relative to a standard three-dimensional ("3-D") space having height, width, and depth. Put simply, the heads illustrated in Waters are objects in standard 3-D space that are the end result of a process, while the examples of claim 1 are provided relative to a multi-dimensional abstract space, and are the starting material for an interpolation processes.

With respect to the "computing" element recited in claim 1, the Office states that "Waters in Figs. 16-22 illustrates weighting values for each of the examples." With respect to the "combining" element of Waters the Office states:

> Walters [sic] in Figs. 16-22 illustrates the step of "combining the single weight values for each of the examples in a manner that defines an interpolated shape or motion that is a blended combination of each of the examples of the set of examples."

With respect to the "computing" step of claim 1, as noted above, it appears that the Office is equating the heads of Figs. 15-22 of Waters with the examples of claim 1. The Applicants can find no mention whatsoever in Waters that a single weighting value is computed for each, or any, of the heads shown in Figs. 15-22, as required by claim 1.

With respect to the "combining" step of claim 1, the Applicants can find no mention whatsoever in Waters of combining single weighting values associated with each of the heads in Figs. 15-22 in a manner that defines an interpolated shape or motion, as required by claims 1.

Since Waters fails to teach or suggest all of the steps of claim 1, Waters does not and cannot anticipate claim 1. Claim 1 is believed to be allowable over Waters, and such allowance is respectfully requested.

Claims 2-12 each depend in some form from claim 1. As such, each of claims 2-12 is necessarily allowable Waters by virtue of this dependency. Each of claims 2-12 also specifies additional features that are not disclosed by Waters.

Claim 13 reads as follows:

13. A blending method comprising:

linearly approximating a degree of freedom that is associated with a new form or motion that is to be rendered based upon a plurality of examples that define respective forms or motions within an abstract space;

defining a radial basis function for each of the examples;

combining the linear approximation and the radial basis functions to provide a cardinal basis function; and

using the cardinal basis function to render the new form or motion.

With respect to the "linearly approximating" step of claim 13, the Office states:

> Walter [sic] in Figs. 4-12 illustrates the step of, "linearly approximating a degree of freedom that is associated with a new form or motion that is to he rendered based upon a plurality of examples that define respective forms or motions within an abstract space"

As previously noted, Waters does not describe forming a new form or motion using other examples, either by linear approximation or otherwise. As such, Waters does not and cannot describe the step of "linearly approximating a degree of freedom that is associated with a new form or motion that is to be rendered based upon a plurality of examples," as recited in claim 13.

The "defining," "combining," and "using" steps of claim 13 each relate to a manner in which the new form or motion is rendered. Since Waters does not describe rendering a new form or motion based on a plurality of forms using examples, Waters can not teach the "defining," "combining," and "using" steps of claim 13.

Since Waters fails to teach or suggest all of the steps of claim 13, Waters does not and cannot anticipate claim 13. Claim 13 is believed to be allowable over Waters, and such allowance is respectfully requested.

Claims 14-15 and 18-21 each depend in some form from claim 13. As such, each of claims 14-15 and 18-21 is necessarily allowable Waters by virtue of this dependency. Each of claims 14-15 and 18-21 also specifies additional features that are not disclosed by Waters.

Claim 22 reads as follows:

22. One or more computer-readable media having computer-readable instructions thereon which, when executed by a computer, cause the computer to:

linearly approximate a degree of freedom that is associated with a new form or motion that is to be rendered based upon a plurality of examples that define respective forms or motions within an abstract space, by deriving basis hyperplanes that fit a least squares hyperplane to a case where one example has a value of 1 and the remaining examples have values of 0;

account for residuals between the example values and the hyperplane by:

associating a radial basis function with each example;

ascertaining a radial basis weight value for each radial basis function; and

scaling each radial basis function by its ascertained radial basis weight value; and

sum the linear approximation and scaled radial basis functions to provide a cardinal basis function.

As previously noted Waters does not describe "rendering a new form or motion based on a plurality of examples that define respective forms or motions within an abstract space." As such, Waters does not and cannot describe the "linearly approximate" step of claim 22.

Since Waters fails to teach or suggest all of the steps of claim 22, Waters does not and cannot anticipate claim 22. Claim 22 is believed to be allowable over Waters, and such allowance is respectfully requested.

Claims 23-27 each depend in some form from claim 22. As such, each of claims 23-27 is necessarily allowable Waters by virtue of this dependency. Each of claims 23-27 also specifies additional features that are not disclosed by Waters.

Claim 28 reads as follows:

28. A computerized blending system comprising:

at least one computer-readable media;

at least one processor;

instructions resident on the computer-readable media which, when executed by the processor, cause the blending system to:

linearly approximate a degree of freedom that is associated with a new form or motion that is to be rendered based upon a plurality of examples that define respective forms or motions within an abstract space, by deriving basis hyperplanes that fit a least squares hyperplane to a case where one example has a value of 1 and the remaining examples have values of 0;

account for residuals between the example values and the hyperplane by:

associating a radial basis function with each example;

ascertaining a radial basis weight value for each radial basis function; and

scaling each radial basis function by its ascertained radial basis weight value; and

sum the linear approximation and scaled radial basis functions to provide a cardinal basis function.

As previously noted Waters does not describe "rendering a new form or motion based on a plurality of examples that define respective forms or motions within an abstract space." As such, Waters does not and cannot describe the "linearly approximate" step of claim 22.

Since Waters fails to teach or suggest all of the steps of claim 22, Waters does not and cannot anticipate claim 22. Claim 22 is believed to be allowable over Waters, and such allowance is respectfully requested.

Claims 29-33 each depend in some form from claim 28. As such, each of claims 29-33 is necessarily allowable Waters by virtue of this dependency. Each of claims 29-33 also specifies additional features that are not disclosed by Waters.

Claim 34 reads as follows:

34. (Previously Presented) A blending method comprising:

defining a set of examples that pertain to a form or motion that is to be animated, the examples being provided relative to a multi-dimensional abstract space defined by at least one of an adjective and an adverb;

examining a plurality of forms or motions that are animated within the abstract space from the defined set of examples;

identifying at least one form or motion that is undesirable;

selecting a form or motion from a location within the abstract space that is proximate a location that corresponds to the undesirable form or motion; and

replacing the undesirable form or motion with the selected form or motion to provide a pseudo-example that constitutes a linear sum of the examples of the set of examples.

The Office suggests that this concept of an undesirable form is shown in Figs. 16-22. The Applicants have reviewed the Waters reference, and in particular Figs. 16-22, and can find no mention or suggestion whatsoever of an undesirable

form. The concept of an undesirable form is simply never discussed in Waters. As such, Waters does describe the "identifying," "selecting," or "replacing" steps of claim 34, each of which are made with some relation to an undesirable form.

Since Waters fails to teach or suggest all of elements of claim 34, Waters does not and cannot anticipate claim 34. Claim 34 is believed to be allowable over Waters, and such allowance is respectfully requested.

Claims 35-38 each depend in some form from claim 34. As such, each of claims 35-38 is necessarily allowable Waters by virtue of this dependency. Each of claims 35-38 also specifies additional features that are not disclosed by Waters.

Claim 39 reads as follows:

39. A blending method comprising:

defining at least two examples of a form in a multi-dimensional abstract space, the multi-dimensional abstract space being defined by at least one of an adjective and an adverb, a first of the example forms being defined in a first position in the multi-dimensional abstract space and a second of the example forms being defined in a second position in the multi-dimensional abstract space that is different from the first position; and

computing a form in the first position such that when the computed form is subjected to a transform blending operation that places the computed form in the second position, it will match the second example form.

The Office states with respect to claim 39 that:

Walter [sic] in Fig. 10 illustrates the step of "defining at least two examples of a form, in a multi-dimensional abstract space, the multi-dimensional abstract space being defined by (Walter [sic] in Fig. 15 illustrates the step of "at least one of an adjective and an adverb", a first of the example forms being defined in a first position in the multi-dimensional abstract space and a second of the example forms being defined in a second position in the multi-dimensional abstract space that is different from the first position; Walter [sic] in Figs. 8-14 illustrates the broad step of "computing a form in the first position such that when the computed form is subjected to a transform blending operation that places the computed form in the second position, it will match the second example form."

Applicants respectfully disagree with all of the Office's assertions with respect to claim 39. With respect to the "defining" element of claim 38, it is not clear at all what the Office is equating with the "at least two examples of a form" recited in claim 38. Is the Office saying that the two muscles in Fig.10 are the at least two examples of a form"? Or, is the Office saying that the two muscles are part of a single form, such as on a head in Fig. 15, and that two of the heads are the "at least two examples of a form"?

If the Office contends that the two muscles in Fig. 10 equate to the "at least two examples of a form" recited in claim 39, it is important to note that there is

simply no discussion in Waters of computing a muscle in the position of the first muscle such that when the first muscle is subjected to a transform blending operation that places the first muscle in the position of the second muscle, it will match the second muscle in form. Rather, Waters describes muscles storing information about each other so that their contraction will not become isometric.

If, however, the Office saying that the two muscles are part of a single form, such as on a head in Fig. 15, it is important to note that there is no discussion whatsoever in Waters of computing a first head in the position of one of the heads such that when the first head is subjected to a transform blending operation that places the first head in the position of a second head, it will match the second head in form. There is no discussion whatsoever in Waters of blending heads. Rather, each of the heads in Fig. 15 is apparently a separately derived example of facial expression. There is no discussion in Waters of moving from one facial expression to another using two of these heads.

Simply put, there is no discussion whatsoever in Waters of computing a form in a first position such that when the computed form is subjected to a transform blending operation that places the computed form in the second position, it will match a second example form.

As Waters fails to teach or suggest all of the elements of claim 39, Waters does not and cannot anticipate claim 39. Claim 39 is believed to be allowable over Waters, and such allowance is respectfully requested.

Claims 40-45 each depend in some form from claim 39. As such, each of claims 40-45 is necessarily allowable Waters by virtue of this dependency. Each of claims 40-45 also specifies additional features that are not disclosed by Waters.

Claim 46 reads as follows:

46. One of more computer-readable media having computer-readable instructions thereon which, when executed by a computer, cause the computer to:

define at least two examples of a form in a multi-dimensional abstract space, the multi-dimensional abstract space being defined by at least one of an adjective and an adverb, a first of the example forms being defined in a first position in the multi-dimensional abstract space and a second of the example forms being defined in a second position in the multi-dimensional abstract space that is different from the first position; and

compute a form in the first position such that when the computed form is subjected to a transform blending operation that places the computed form in the second position, it will match the second example form.

Claim 46 recited a computer readable includes the same steps recited in method claim 39. As such, claim 46 is believed to be allowable of Waters for the same reasons set forth above with respect to Claim 39.

CONCLUSION

Claims 1-46 are believed to be in condition for allowance. Applicant respectfully requests reconsideration and prompt issuance of the present

application. Should any issue remain that prevents immediate issuance of the application, the Examiner is encouraged to contact the undersigned attorney to discuss the unresolved issue.

Respectfully Submitted,

Dated: 2/23/04

By: _____

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